$t = 0.7\ s$ (estimation) $\quad \Delta x = 8.91\ m$

initial angle $= 30^\circ$ (estimation)

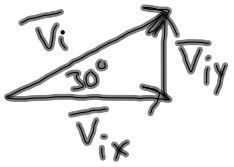
Calculate v_i, max. height

- find v_{ix}

$$\Delta x = v_{ix} t$$

$$v_{ix} = \frac{\Delta x}{t} = \frac{8.91\ m}{0.7\ s} = 12.7\ m/s$$

- find v_i, use a triangle



$$\cos(30^\circ) = \frac{v_{ix}}{v_i}$$

$$v_i = \frac{v_{ix}}{\cos(30)}$$

$$= 14.7\ m/s$$

- find max. height

at max. height, $v_{fy} = 0\ m/s$

$$v_{fy}^{\cancel{2}\ \cancel{0}} = v_{iy}^2 + 2a_g \Delta y$$

find v_{iy} from above triangle
$v_{iy} = 7.35\ m/s$

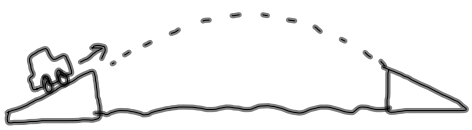
$$\Delta y = \frac{-v_{iy}^2}{2a_g} = \frac{-(7.35\ m/s)^2}{2(-9.8\ m/s^2)} = 2.76\ m$$

$t = 2.1$ s (estimation) assume starting and landing heights are the same

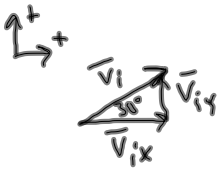
$\Delta x = 269$ ft $= 82$ m

initial angle $= 30°$

Calculate V_i, max. height, $\bar{V}_f$ (mag., angle, direction)



- find v_{ix}: $v_{ix} = \frac{\Delta x}{t} = 39.1$ m/s



$V_i = \frac{V_{ix}}{\cos(30°)} = 45.1$ m/s

V_{iy} → from Pythag. thm. or sin or tan

$V_{iy} = 22.6$ m/s

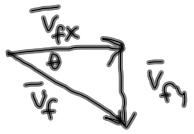
- find max. height:

$\Delta y = V_{iy}t + \frac{1}{2}a_g t^2$ → use $t = 1.05$ s and $a_g = -9.8$ m/s²

$= 18.3$ m

$\Delta y = \frac{-V_{iy}^2}{2a_g} = 25.9$ m

- find $\bar{V}_f$: if we assume that problem is symmetrical, $V_{fy} = -V_{iy}$



$\theta = \tan^{-1}\left(\frac{V_{fy}}{V_{fx}}\right)$

$= \tan^{-1}\left(\frac{22.6 \text{ m/s}}{35.1 \text{ m/s}}\right)$

$= 30.028°$

$V_f = 45.2$ m/s